

REMARKS

This is intended as a full and complete response to the Office Action dated April 29, 2008, having a shortened statutory period for response set to expire on July 29, 2008. Please reconsider the claims pending in the application for reasons discussed below.

Claims 23-48 remain pending in the application and are shown above. Claims 1-22 and 49-80 have been cancelled by Applicant. Claims 23-48 are rejected by the Examiner. Claims 23 and 36 are amended to clarify certain aspects of the invention. Reconsideration of the rejected claims is requested for reasons presented below.

Claim Rejections – 35 U.S.C. § 103

Claims 23 and 36 are rejected under 35 U.S.C. § 103(a) as being unpatentable over *Cain et al.* (U.S. Patent No. 5,439,524) in view of *Hamelin et al.* (U.S. Publ. No. 2006/0134919) and *Fukuda* (U.S. Publ. No. 2003/0097987). Applicant respectfully traverses the rejection.

Cain et al. teach a plasma processing apparatus having an RF power source coupled to a gas distribution plate with a concave lower surface. The gas distribution plate has a plurality of gas passages extending therethrough. *Cain et al.* do not teach a gas passage located in the center of the diffuser plate having hexagonal patterns of gas passages disposed thereabout. *Cain et al.* do not teach each gas passage having a first cylindrical shape for a portion of its length extending from the upstream side, a second coaxial cylindrical shape with a smaller diameter connected to the first cylindrical shape and extending for a portion of its length, a coaxial conical shape connected to the second cylindrical shape for the length of the remaining portion of the diffuser plate, with the upstream end of the conical shape having substantially the same diameter as the second cylindrical shape and the downstream end of the conical shape having a larger diameter. *Cain et al.* do not teach a diffuser plate coupled to a remote plasma source that is coupled to a fluorine source.

Hamelin et al. teach a chemical treatment chamber having a gas distribution assembly (440) with a first (430) and second (432) gas distribution plates coupled together. The first gas distribution plate (430) has a plurality of cylindrical apertures (446) of constant diameter, each extending from an upstream side of the gas distribution assembly (440) to communicate with a corresponding aperture (444) of second gas distribution plate (432). The apertures (444) extend from a first section of constant diameter to a section wherein the diameter tapers to a second section of constant diameter, smaller than the first. Therebelow, the second section flares with increasing diameter to a downstream side of the gas distribution assembly (440) (Figs. 9A,B). *Hamelin et al.* do not teach or suggest a gas distribution plate assembly for a plasma deposition chamber including a diffuser plate having an upstream side and a downstream side in the plasma deposition chamber. *Hamelin et al.* do not teach or suggest an RF power source coupled to the diffuser plate. *Hamelin et al.* also do not teach a gas passage located in the center of the diffuser plate having hexagonal patterns of gas passages disposed thereabout, wherein each gas passage passes between the upstream and downstream sides.

Fukuda discloses a remote plasma cleaning method in which a cleaning gas (NF_3) is excited to a plasma state by microwaves inside an external discharge chamber coupled to a reaction chamber. *Fukuda* also does not teach a gas passage located in the center of a diffuser plate having hexagonal patterns of gas passages disposed thereabout. *Fukuda* does not disclose each gas passage of a diffuser plate passing between the upstream and downstream sides and having a first cylindrical shape for a portion of its length extending from the upstream side, a second coaxial cylindrical shape with a smaller diameter connected to the first cylindrical shape and extending for a portion of its length, a coaxial conical shape connected to the second cylindrical shape for the length of the remaining portion of the diffuser plate, with the upstream end of the conical shape having substantially the same diameter as the second cylindrical shape and the downstream end of the conical shape having a larger diameter.

Cain et al., *Hamelin et al.*, and *Fukuda*, alone or in combination, do not teach, show, or suggest a plurality of gas passages passing between the upstream and downstream

sides of a diffuser plate, wherein at least one of the gas passages is located in the center of the diffuser plate and hexagonal patterns of gas passages are disposed thereabout.

Therefore, *Cain et al.*, *Hamelin et al.*, and *Fukuda*, alone or in combination, fail to teach, show, or suggest a gas distribution plate assembly for a plasma deposition chamber comprising a diffuser plate having an upstream side and a downstream side in the plasma deposition chamber, a plurality of gas passages passing between the upstream and downstream sides, wherein at least one of the gas passages is located in the center of the diffuser plate and hexagonal patterns of gas passages are disposed thereabout, each gas passage has a first cylindrical shape for a portion of its length extending from the upstream side, a second coaxial cylindrical shape with a smaller diameter connected to the first cylindrical shape and extending for a portion of its length, a coaxial conical shape connected to the second cylindrical shape for the length of the remaining portion of the diffuser plate, with the upstream end of the conical shape having substantially the same diameter as the second cylindrical shape and the downstream end of the conical shape having a larger diameter, and an RF power source coupled to the diffuser plate as recited in amended claim 23 and claims 24-35 dependent thereon. Applicant respectfully requests withdrawal of the rejection.

Additionally, *Cain et al.*, *Hamelin et al.*, and *Fukuda*, alone or in combination, fail to teach, show, or suggest a gas distribution plate assembly for a plasma deposition chamber comprising a diffuser plate having an upstream side and a downstream side in the plasma deposition chamber that is coupled to a remote plasma source and the remote plasma source is coupled to a fluorine source, a plurality of gas passages passing between the upstream and downstream sides, wherein at least one of the gas passages is located in the center of the diffuser plate and hexagonal patterns of gas passages are disposed thereabout, each gas passage has a first cylindrical shape for a portion of its length extending from the upstream side, a second coaxial cylindrical shape with a smaller diameter connected to the first cylindrical shape and extending for a portion of its length, a coaxial conical shape connected to the second cylindrical shape for the length of the remaining portion of the diffuser plate, with the upstream end of the conical shape having

substantially the same diameter as the second cylindrical shape and the downstream end of the conical shape having a larger diameter, and an RF power source coupled to the diffuser plate as recited in amended claim 36 and claims 37-48 dependent thereon. Applicant requests withdrawal of the rejection.

Claims 24-31, 33, 35, 37-44, 46 and 48 are rejected under 35 U.S.C. § 103(a) as being unpatentable over *Cain et al.* (U.S. Patent No. 5,439,524) in view of *Hamelin et al.* (U.S. Publ. No. 2006/0134919) and *Fukuda* (U.S. Publ. No. 2003/0097987) as discussed in claims 23 and 36 above and further in view of *Metzner et al.* (U.S. Patent No. 6,454,860). Applicant respectfully traverses the rejection.

The deficiencies of *Cain et al.*, *Hamelin et al.*, and *Fukuda* are discussed above with respect to base claims 23 and 36. The teachings of *Metzner et al.* do not cure these deficiencies. Applicant respectfully requests withdrawal of the rejection.

Claims 32 and 34 are rejected under 35 U.S.C. § 103(a) as being unpatentable over *Cain et al.* (U.S. Patent No. 5,439,524) in view of *Hamelin et al.* (U.S. Publ. No. 2006/0134919) and *Fukuda* (U.S. Publ. No. 2003/0097987) and *Metzner et al.* (U.S. Patent No. 6,454,860) as discussed in claims 24-31, 33, 35, 37-44, 46 and 48 above and further in view of *White et al.* (U.S. Publ. No. 2003/0066607). Applicant respectfully traverses the rejection.

The deficiencies of *Cain et al.*, *Hamelin et al.*, and *Fukuda* are discussed above with respect to base claims 23 and 36. The teachings of *Metzner et al.* and *White et al.* do not cure these deficiencies. Applicant respectfully requests withdrawal of the rejection.

In conclusion, the references cited by the Examiner, alone or in combination, do not teach, show, or suggest the invention as claimed.

The secondary references made of record are noted. However, it is believed that the secondary references are no more pertinent to the Applicant's disclosure than the primary references cited in the office action. Therefore, Applicant believes that a detailed

discussion of the secondary references is not necessary for a full and complete response to this Office Action.

Having addressed all issues set out in the office action, Applicant respectfully submits that the claims are in condition for allowance and respectfully request that the claims be allowed.

Respectfully submitted,

By 

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